

REMARKS

Entry of the foregoing, re-examination and reconsideration of the application identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.112, and in light of the remarks which follow, are respectfully requested.

The claims have been renumbered as requested by the Examiner. Renumbered claims 31 and 32 have been canceled and other claims have been amended in response to issues raised in the Office Action. Claims 17-30 and 33-36 remain pending in this application.

Claims 17-36 were rejected under 35 U.S.C. § 112, second paragraph, for reasons expressed in paragraphs (2-7) of the Office Action. Reconsideration of these rejections as applied to the presently amended claims, is requested.

Specifically, the dependency of claim 34 has been corrected. Also, the language "more than two blocking groups" in claims 17 and 35 has been amended to read --more than two blocking functional groups-- to provide proper antecedent basis. Claims 20 and 22 have been amended to indicate that the recited ratios are by weight. This is supported by the working examples which employ reactant amounts in grams. Claim 23 has been clarified, claim 32 has been canceled, claim 33 has been amended to delete the terminology considered objectionable by the Examiner. Accordingly, the § 112 rejections should be withdrawn.

The specification has been objected to for reasons set forth in paragraph (8) of the Office Action. In response thereto, claims 28 and 30 have been amended and claim 31



canceled. Support for the amendment to claim 28 may be found on page 14, line 25 of the disclosure while support for the amendment to claim 30 may be found on page 14, line 26. Accordingly, the objection to the specification has been obviated and should be withdrawn.

Claims 17-25 and 28-36 have been rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent 5,510,432 to Schmalstieg et al. or U.S. Patent 5,523,377 to König et al. for reasons set forth in paragraph (10) of the Office Action. Reconsideration of this rejection is requested in view of the following comments.

The presently amended claims specify that the isocyanates being treated are aliphatic. Support may be found throughout the disclosure including page 11, lines 34-35; page 14, lines 3-18; etc.

The isocyanates described in Schmalstieg et al. '432 are aromatic in nature. There is no disclosure therein of aliphatic isocyanates. Accordingly, the § 102 rejection based on this patent should be withdrawn.

The isocyanates disclosed in König et al. '377 are aliphatic. However, the blocked isocyanates described therein do not satisfy the three conditions now set forth in the present claims:

- at least one third of the free or blocked NCO functional groups must be connected to a hydrocarbonaceous backbone via a saturated (sp^3) carbon;
- at least one third of said saturated (sp^3) carbons carry at least one hydrogen;

- at least one third of said saturated (sp^3) carbons must be connected to said backbone via a carbon atom itself bearing at least one hydrogen. Accordingly, the § 102 rejection based on König et al. '377 should be withdrawn.

Claims 17-36 have been rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent 4,096,291 to Dunwald et al. or U.S. Patent 5,510,432 to Schmalstieg et al. or U.S. Patents 5,523,377, 5,350,825 or 5,596,064 to König et al. for reasons set forth in paragraphs (11-13) of the Office Action. Reconsideration of these rejections is requested in view of the following.

One objective of the present invention is to provide blocked polyisocyanate compositions which can be added to coating compositions and reacted with a polyol. One of the advantages of blocked isocyanate compositions is that they are stable at ambient temperature, even for a long period of time, the deblocking of the isocyanate functions being effected under heating at a high temperature. It is known that certain blocking agents, especially (poly)nitrogen heterocyclic types, e.g., a triazole, can be unblocked at relatively low temperatures. However, such blocked isocyanates are only weakly soluble in the solvents currently used for this type of application. Other blocking agents, for example oxime types, give blocked polyisocyanate compositions which have good solubility properties in the usual solvents; the unblocking temperatures are relatively high (see page 4, lines 11-24 of the disclosure).

The present invention is designed to take advantage of both types of blocking agents without any drawbacks, thus providing a polyisocyanate composition which has good

solubility, and, unblocking temperatures similar to, and conveniently close to, a temperature corresponding to that of the lowest unblocking temperature of the blocking agents.

It has surprisingly been discovered that the compositions as claimed herein, possess the advantages of low dissociation (i.e., unblocking) temperature and good solubility. More precisely, it has been surprisingly and unexpectedly discovered that the mixed blocked polyisocyanate compositions as defined and with all the characteristics as claimed, exhibit the solubility properties that are required for use as coating compositions where both blocking agents are freed at a dissociation temperature similar to the lowest dissociation temperature of the two blocking agents. This result clearly is shown in the examples and data disclosed in the specification.

In stark contrast to the claimed invention, the blocking agents described in the cited prior art cannot be considered as blocking agents according to the invention, that is, having a dissociation temperature comprised between 80 and 200°C in the octanol test. All primary alcohols have a dissociation temperature similar to that of octanol and therefore can not fulfill the definition according to the invention since, at this temperature, only 50% of the alcohols are dissociated and not more than 90% as stated in the test definition (octanol test described on pages 16 and 17 of the specification). None of the cited references, taken alone or in combination, discloses or suggests a mixed blocked polyisocyanate composition which has a dissociation temperature similar to the lowest dissociation temperature of the two blocking agents taken separately.

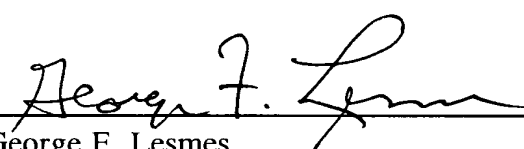
Thus, none of the cited references teaches the skilled artisan to provide aliphatic isocyanate compositions that are blocked with two different blocking agents as defined in the present claims. It is respectfully submitted that the decisive question is not whether a skilled person could have performed the subject of the present invention but rather whether he would have done so with the expectation of solving the problem linked to the contradictory parameters of two blocking agents as discussed above. Based on the above arguments, the § 103(a) rejections are inapplicable to the presently amended claims and should be withdrawn.

In view of the above amendments and remarks, it is respectfully submitted that this application is now in allowable condition. An early and favorable indication to that effect is earnestly solicited.

Respectfully submitted,

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Marked-up Claims 17-30 and 33-36

[20.] 17. (Amended) A composition comprising aliphatic isocyanates, at least partially blocked by at least two different blocking agents, one of the blocking agents reacting with the isocyanate function group via an OH group and the other reacting with the isocyanate functional group via an NH group or the at least two blocking agents reacting with the isocyanate functional group via an OH group, the at least two blocking agents having a deblocking temperature of between 80 and 200°C in the octanol test and being selected so that, in the octanol test at 110°C, the ratio

$$D = \frac{\text{percentage in equivalents of blocking agent which deblocks first at } 110^{\circ}\text{C}}{\text{percentage in equivalents of blocking agent which deblocks last at } 110^{\circ}\text{C}}$$

is greater than 4/3, with the proviso that, when a blocking agent comprises a phenol functional group as blocking functional group, it does not comprise a COOH functional group and that, when the [polyisocyanate] composition comprises more than two blocking functional groups and one of the agents represents a five-membered nitrogenous heterocycle, the composition comprises more than 30 equivalent % of blocking agents reacting with the isocyanate functional group via the OH functional group[.], wherein said at least partially blocked aliphatic isocyanates fulfill the following conditions:

- at least one third of the free or blocked NCO functional groups are connected to a hydrocarbonaceous backbone via a saturated (sp³) carbon;

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Marked-up Claims 17-30 and 33-36

- at least one third of said saturated (sp³) carbons carry at least one hydrogen; and
- at least one third of said saturated (sp³) carbons are connected to said backbone via
a carbon atom itself bearing at least one hydrogen.

[21.] 18. (Amended) A composition comprising isocyanates at least partially blocked, by at least two different blocking agents as defined in claim [20,] 17. wherein said ratio D is greater than 1.5.

[22.] 19. (Amended) A composition comprising isocyanates at least partially blocked by at least two different blocking agents as defined in claim [20,] 17. wherein said ratio D is greater than 2.

[23.] 20. (Amended) The composition of claim [20,] 17. wherein the ratio of the blocking groups is between 10/90 and 90/10 by weight.

[24.] 21. (Amended) The composition of claim [20,] 17. wherein one of the blocking agents is a substituted or unsubstituted (poly)nitrogenous heterocyclic compound.

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[25.] 22. (Amended) The composition of claim [20,] 17. wherein the ratio of the blocking groups is between 20/80 and 80/20 by weight.

[26.] 23. (Amended) The composition of claim [20,] 17. wherein one of the blocking agents is selected from the group consisting of pyrazole, triazole and pyridine, each being optionally substituted.

[27.] 24. (Amended) The composition of claim [26,] 23. wherein one of the blocking agents is triazole, optionally substituted.

[28.] 25. (Amended) The composition of claim [20,] 17. wherein one of the two blocking agents is an oxime.

[29.] 26. (Amended) The composition of claim [20,] 17. wherein one of the blocking agents is an oxime selected from the group consisting of methyl ethyl ketoxime, acetone oxime, methyl amyl ketoxime, the oxime of methyl pyruvate and the oxime of ethyl pyruvate.

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Marked-up Claims 17-30 and 33-36

[30.] 27. (Amended) The composition of claim [20,] 17. wherein said blocking agents are selected from the pairs:

- triazole/methyl ethyl ketoxime,
- triazole/oxime of ethyl pyruvate,
- dimethylpyrazole/methyl amyl ketoxime,
- hydroxypyridine/methyl amyl ketoxime, and
- dimethylpyrazole/hydroxypyridine.

[31.] 28. (Amended) The composition of claim [20,] 17. comprising a mixture of compounds bearing blocked isocyanate functional group(s), wherein said compounds exhibit a mean functionality (number of blocked or nonblocked isocyanate functional groups per molecule comprising them) of greater than 2, and at most equal to [5] about 15.

[32.] 29. (Amended) The composition of claim [20,] 17. comprising a mixture of compounds bearing blocked isocyanate functional group(s), wherein said compounds exhibit a mean functionality (number of blocked or nonblocked isocyanate functional groups per molecule comprising them) at least equal to 2.1, and at most equal to 4.

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[33.] 30. (Amended) The composition of claim [20,] 17. comprising a mixture of compound bearing blocked isocyanate functional group(s) wherein said compounds exhibit a mean functionality (number of blocked or nonblocked isocyanate functional group per molecule comprising them) at least equal to 2.4 and at most equal to 7.

[36.] 33. (Amended) A kit for the preparation of a coating, comprising, [for successive or simultaneous addition,] a composition of claim [20] 17 and a coreactant comprising a reactive hydrogen.

[37.] 34. (Amended) The kit of claim [30,] 33. for the preparation of a paint.

[38.] 35. (Amended) A process for the preparation of a composition, comprising the step of reacting [a] an aliphatic (poly)isocyanate composition, successively or simultaneously, with at least two different blocking agents, one of the blocking agents reacting with the isocyanate functional group via an OH group and the other reacting with the isocyanate functional group via an NH group or the at least two blocking agents reacting with the isocyanate functional group via an OH group, the at least two blocking agents having a deblocking temperature of between 80 and 200°C in the octanol test and being selected so that, in the octanol test at 110°C, the ratio

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Marked-up Claims 17-30 and 33-36

$$D = \frac{\text{percentage in equivalents of blocking agent which deblocks first at } 110^{\circ}\text{C}}{\text{percentage in equivalents of blocking agent which deblocks last at } 110^{\circ}\text{C}}$$

is greater than 4/3, with the proviso that, when a blocking agent comprises a phenol functional group as blocking functional group, it does not comprise a COOH functional group and that, when the polyisocyanate composition comprises more than two blocking functional groups and one of the agents represents a five-membered nitrogenous heterocycle, the composition comprises more than 30 equivalent % of blocking agents reacting with the isocyanate functional group via the OH functional group[.], wherein the following conditions are fulfilled:

- at least one third of the free or blocked NCO functional groups are connected to a hydrocarbonaceous backbone via a saturated (sp³) carbon;
- at least one third of said saturated (sp³) carbons carry at least one hydrogen; and
- at least one third of said saturated (sp³) carbons are connected to said backbone via a carbon atom itself bearing at least one hydrogen.

[39.] 36. (Amended) A process for the preparation of coating polymers, comprising the following steps:

- bringing together the composition of claim [20] 17 and a coreactant which comprises derivatives exhibiting reactive hydrogens; and

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Marked-up Claims 17-30 and 33-36

- heating the reaction mixture thus formed to a temperature which allows crosslinking of the isocyanate groups of compounds with said coreactant.